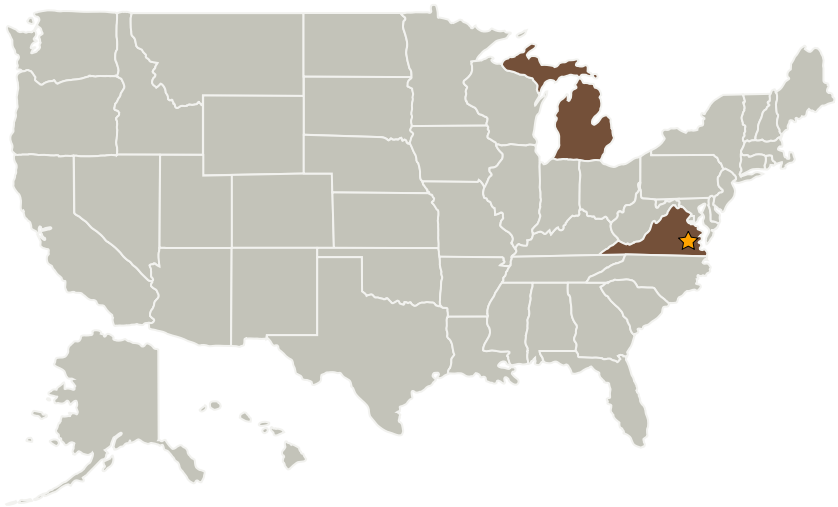
355nm Photon-Recycled Fringe Imager for HSRL, Phase I

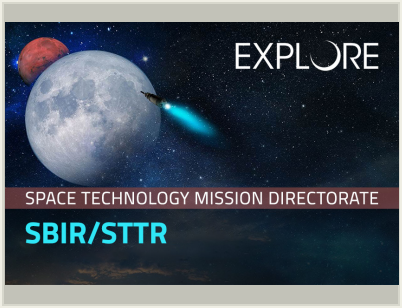
Completed Technology Project (2008 - 2008)

Project Introduction

The proposed work is to develop a high-efficiency aircraft-qualified Fabry-Perot-based interferometer for the High Spectral Resolution LIDAR (HSRL). Through this Phase I effort, Michigan Aerospace Corporation (MAC) will perform instrument simulations to optimize a photon-recycled fringe imaging receiver to meet the HSRL measurement requirements. Photon-recycled fringe imaging technology incorporates the use of high-efficiency Charge Couple Devices (CCDs) to enable range-gated measurements with high spectral resolution of the atmospheric backscatter from molecules and aerosols. During this Phase I effort, MAC will also perform a thorough investigation of the current state of commercial and customizable CCD technology in order to ensure the highest level of efficiency and range resolution available is achieved. The optimized 355nm receiver will be capable of spectrally separating the aerosol and molecular backscatter components in order to deduce the aerosol to total scattering ratio and aerosol extinction. End-to-end simulations will enable a thorough characterization of the measurement biases introduced from instrument instabilities and enable driving requirements to be formed for a Phase II build. Also during Phase I, solid model receiver concepts and trade studies will be performed to enable a smooth transition to Phase II so that the HSRL receiver can be ready for flight in 2008.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Michigan Aerospace Corporation	Supporting Organization	Industry	Ann Arbor, Michigan

Primary U.S. Work Locations	
Michigan	Virginia

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Scott Lindemann

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves